Operating instructions

Temperature measurement amplifier TMV 4

Certified according to ISO 9001:2008

Please refer to this instruction manual before connecting or operating the instrument!

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1. General description:

The Gneuß temperature measurement amplifier type TMV 4 is a measurement amplifier for thermocouples or PT 100 measurement resistors.
Universal setting possibilities guarantee that up to two freely selectable limit contacts and one analogue signal of 0-20 mA or 4-20 mA resp. 0-10 V can be processed. A peak hold function, simple operation via a touch-sensitive keypad and extreme sturdiness guarantee a high ease of operation. The unit can be protected against unauthorized use via possible software settings.

2. Technical data:

Front housing with an installation depth of 110 mm including terminal block with quick-lock function by means of plastic clamps, for wall thicknesses of up to 10 mm.

Colour:	dark grey
Dimensions:	96 mm x 48 mm = 1/8 DIN
Weight:	approx. 250 g
Panel cut-out size:	$92{,}0^{+0{,}8}$ x $45{,}0^{+0{,}6}$
IP rating:	Front IP 65, connection IP 00
Thermocouples:	L, J, T, K, S, R, B, N, E , NI-NiMo18%, W3, W5 (IEC 584), Rj >10MΩ
Resistance thermocouples:	Pt100 IEC751
Cold junction compensation:	by means of NTC
Output resistance Pt100:	Max. 20Ω
Output resistance thermocouples:	Max. 150Ω
Limit value relay:	Up to 2 over the overall measuring span freely adjustable relays Switching capacity: 250 VAC = 2A / 120 VAC = 4A
Fail-safe feature:	Performance control – sensor connections
Accuracy:	+/- 0,1 % of measuring value

Power supply:	100…230 VAC +/- 10 %, 50 - 60 Hz Power consumption approx. 4 W (optional: 24 VDC)
Display:	5-digit seven-segment LEDs, 15 mm high, luminous: green or red when exceeding a preset alarm parameter, indicating range -99999….99999, arithmetic overflow is indicated by 5 cross-ledgers
Measuring unit:	°C / °F selectable
Connection of the instrument:	On the reverse via a 36-pole terminal block
Ambient conditions:	Operating temperature 0-50 °C / humidity level 5….95 % (no condensation)
Analogue output:	0-20 mA or 4-20mA at current load 750 ohm/15V max. 0-10V at 500 ohm resistance at 0-20 mA set parameter

3. Assembly:

The instrument is designed for panel assembly. It is to be assembled in such a manner, as to protect it from humidity, dirt and vibration. The ambient temperature is not to exceed 50 °C.

4. Electrical connection:

The instrument is only to be connected and operated by qualified personnel. Please see attached diagram for wiring connections. The local regulations for operating electrical factory equipment are to be stringently adhered to.

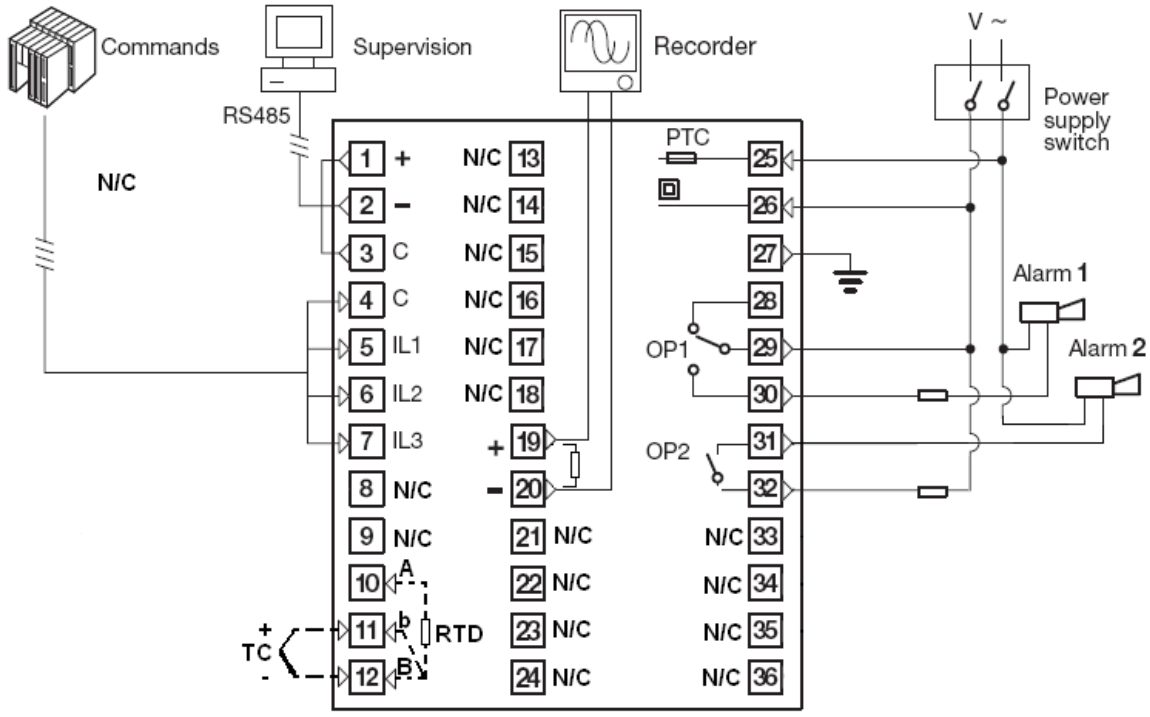
CE-Mark

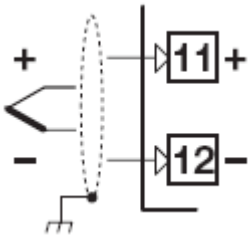
For unrestricted operation of the instrument according to the guidelines of the electromagnetic compatibility 89/336/EWG all analogue wiring needs to be shielded. The shield is to be one sided.

UL recommendation: 1) Use copper conductors designed for temperatures up to 60/70 °C
2) Minimum cross-section of 1 mm² to be utilized. (AWG 18)

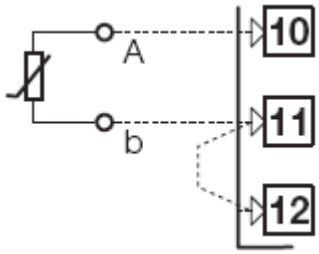
Analogue output:
For an analogue output of 0-10 V, the pre-installed 500 ohm resistance is to be used with a set parameter of 0-20 mA. **For all other outputs, the pre-installed 500 ohm resistance has to be removed from terminals 19 / 20.**

Wiring configuration:

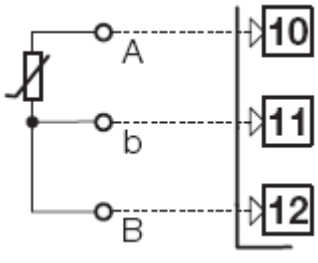


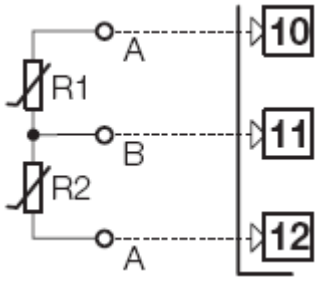


Output resistance max. 150 ohm



Output resistance max. 20 ohm



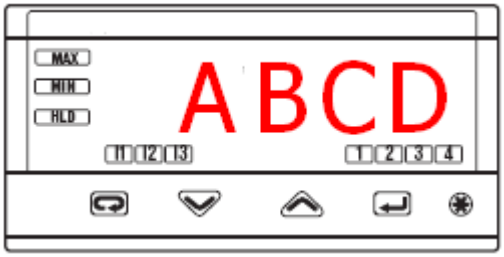


Output resistance max. 20 ohm

5. Adjustment possibilities:

5.1 Determination of configuration codes

Digits of configuration code 1

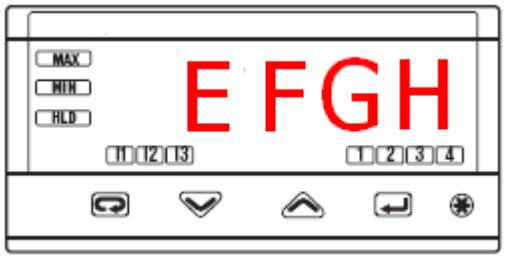


First configuration code (Con.1)						
Type	Range °C	Range °F	A	B	C	D
TR Pt100 IEC751	-99.9 - 300 °C	-99,9 - 572 °F	0	0		
TR Pt100 IEC751	-200 - 600 °C	-328 -1112 °F	0	1		
TC L Fe-Const DIN43710	0 - 600 °C	32 - 1112 °F	0	2		
TC J Cu45% Ni IEC584	0 - 600 °C	32 - 1112 °F	0	3		
TC T Cu-CuNi	-200 - 400 °C	-328 - 752 °F	0	4		
TC K Chromel-Alumel ICE584	0 - 1200 °C	32 -2192 °F	0	5		
TC S Pt10%Rh-Pt ICE584	0 -1600 °C	32 - 2912 °F	0	6		
TC R Pt13%Rh-Pt ICE584	0 -1600 °C	32 - 2912 °F	0	7		
TC B Pt30%Rh Pt6%Rh IEC584	0 -1800 °C	32 - 3272 °F	0	8		
TC N Nichrosil-Nisil IEC584	0 -1200 °C	32 - 2192 °F	0	9		
TC E Ni10%Cr-CuNi ICE584	0 - 600 °C	32 - 1112 °F	1	0		
TC NI-NiMo18%	0 -1100 °C	32 -2012 °F	1	1		
TC W3%Re-W25%Re	0 -2000 °C	32 - 3632 °F	1	2		
TC W5%Re-W26%Re	0 -2000 °C	32 - 3632 °F	1	3		
Display mode						
Green					0	
Red					1	
Red, if alarm is active					2	
Keep to max. values						
(function does not exist)						0

Example for configuration code 1:

03 – thermocouple type J
2 – in case of alarm, display colour changes to red
0 – (function does not exist)

Digits for configuration code 2



Second configuration code (Con.2)				
Type of alarm and function	E	F	G	H
Alarm output	1	2	X	X
Not active	0		0	0
Contact closed in case of sensor break	1		0	0
Contact closed if limit value is exceeded	2		0	0
Contact open if limit value is exceeded	3		0	0

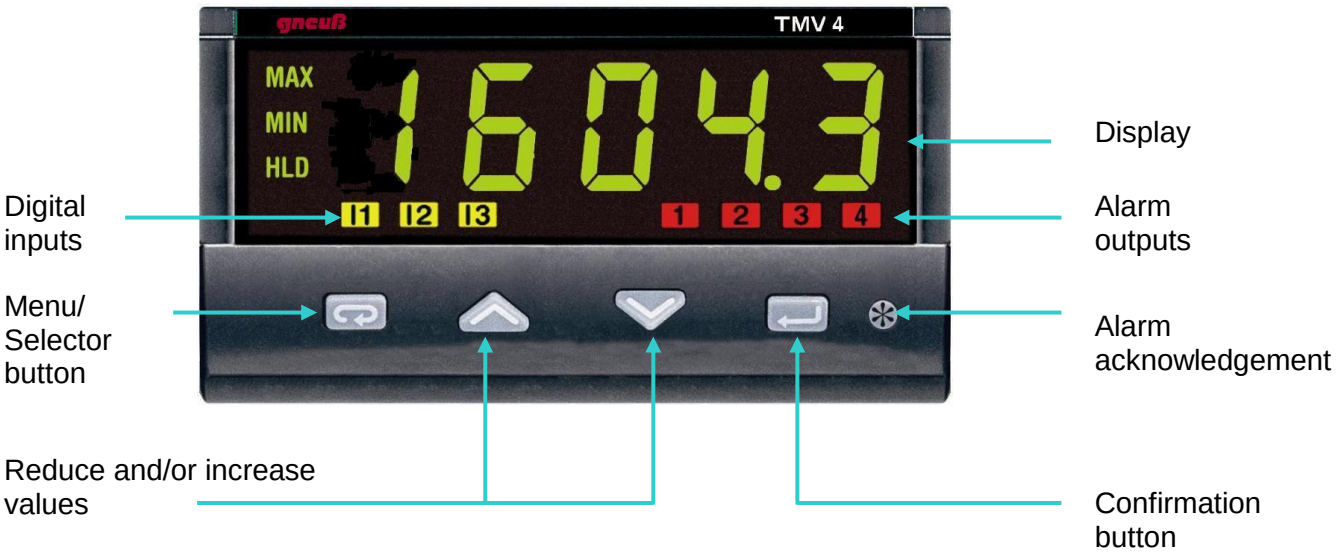
Example for configuration code 2:

1 – Limit value output 1 is active in case of sensor break
2 – If the limit value is exceeded, alarm output 2 is closed
00 – (Function does not exist)

5.2 Parameters

	Main Menu	Parameter		Parameter Name	Default value	Available settings
PASS	AL_SP			Alarm Set		
	(OPTIONAL)	AL.1SP	AL_ 1SP	AL1 alarm threshold	0	0….final value
	(OPTIONAL)	AL.2SP	AL_ 2SP	AL2 alarm threshold	0	0….final value
	(OPTIONAL)	AL.1hy	AL_ 1 hY	AL1 alarm high hysteresis	0,5	0,1…10,0
	(OPTIONAL)	AL.2hy	AL_ 2 hY	AL2 alarm high hysteresis	0,5	0,1…10,0
	MEAS			Setting of analogue output		
	(OPTIONAL)	AO.Src	Ao_Src	Analogue output source	none	nonE r 1 n 1
	(OPTIONAL)	AO.tyP	AO_tyP	Analogue output type	0 - 20	0-20/4-20mA
	(OPTIONAL)	AO.Lo	AO_Lo	Analogue output low range	0	-9999…32000
	(OPTIONAL)	AO.Hi	AO_H i	Analogue output high range	10000	-9999…32000
	ALArM			Alarm functions		
		AL.1Lb	AL1 _Lt	Reset by acknowledgement	none	none/latching
		AL.2Lb	AL2_Lt	Reset by acknowledgement	none	none/latching
	ConF			Configuration menu		
		Pass	PASS	Password entry (Code)	33	0..9999
		Con.1	Con_ 1	1st part of configuration code	9999	0…9999
		Con.2	Con_2	2nd part of configuration code	0	0…9999
		IL1	iL 1	IL1 digital input function	none	nonE r ACH
		IL2	iL2	IL2 digital input function	none	nonE r ACH
		Unit	Un it	Engineering units	°C	°C/°F
		in.1dd	dP	Number of decimals	0	0…1
		t.FiL1	FI Lt	In1 Input filter (filter time constant)	0	0…30s
		in.1Sh	in_ 1Sh	Input Shift	0	-60…60 digits
	(OPTIONAL)	Prot	Prot	Communications protocol	Jbus	M_bUSrJbUS
	(OPTIONAL)	baud	bAUd	Baud rate	9600	1200/2400/4800/960
	(OPTIONAL)	Addr	Addr	Serial communications address	1	1…247
		s.Out	S_OUt	Safety output	Lo	Hi / Lo
		Code	CodE	Password	33	0..9999

6. Display and operating elements:



Button functions and combinations:

Selects between parameter levels and configuration level. By selecting within the parameter and configuration levels, either the operating mode is reached or sub-menus can be chosen.

By activating in programme mode, the selected value is decreased.
By activating in operating mode, the MIN memory is evaluated and displayed.

By activating in programme mode, the selected value is increased.
By activating in operating mode, the MAX memory is evaluated and displayed.

By activating within the parameter levels or the configuration level, all sub-menus are switched over or the changed value is stored.

By activation, the internal peak hold function MIN / MAX is deleted and updated or the alarm outputs are reset, if reset by acknowledgement is active.

7. Programme access / barring:

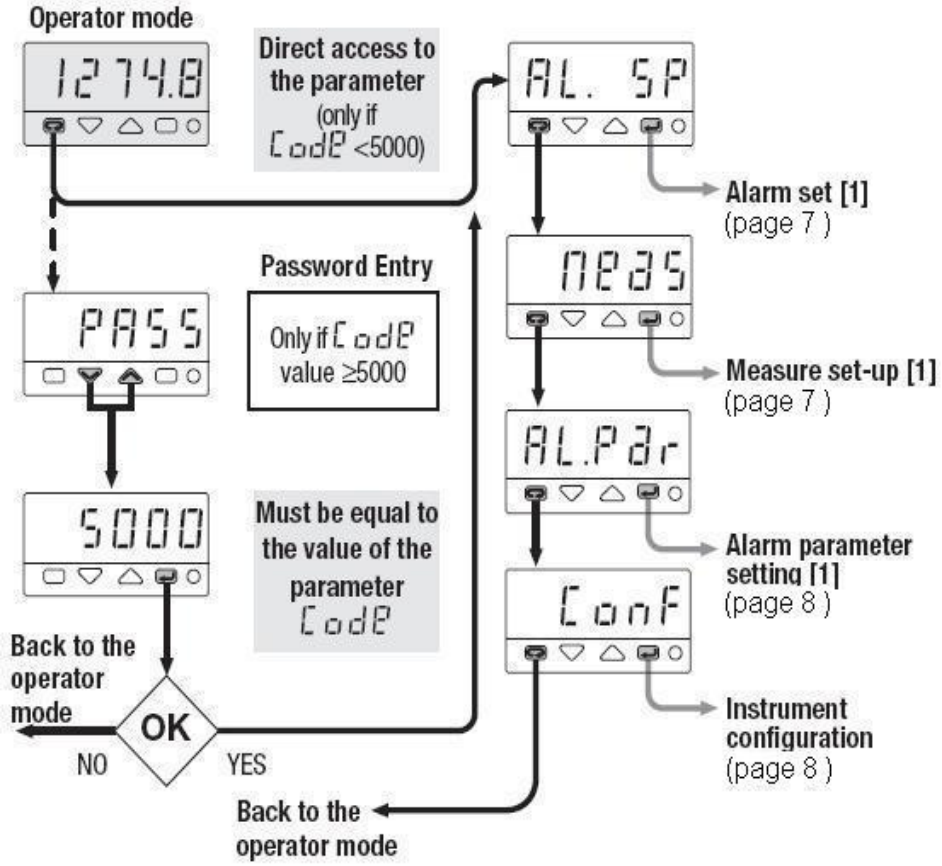
The TMV 4 allows all accessibility levels to be password protected (to be set in the configuration menu under parameter „CodE“ - see page 11).

8. Commissioning:

Listed below is a step-by-step breakdown for start-up and commissioning purposes.
1. Confirm no supply voltage.
2. Connect TMV 4 according to wiring diagram (page 4).
3. Connect supply voltage. After approx. 3 seconds the TMV 4 is ready for operation.
4. During first commissioning, the unit immediately switches to configuration codes 1 and 2 (see tables page 5 and 6).

Adjustment levels (see also table on page 7).

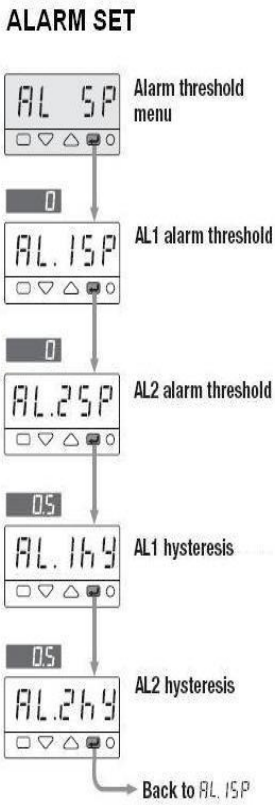
By repeatedly activating the button , the TMV 4 switches from operating mode to parameter mode (AAL SPSP_ MEAS_ ALArM) and to configuration mode (ConF). On pushing again, the instrument is set back to operating mode.



To access all levels, a password has to be entered after pushing (only if this is larger than 5000). This is done by holding down the buttons and the instrument automatically selects ones, tens, hundreds and thousands and selectably increases or decreases.
If the right password is entered, the selected level is reached by pushing .

Settings of alarm outputs:

Parameter explanation



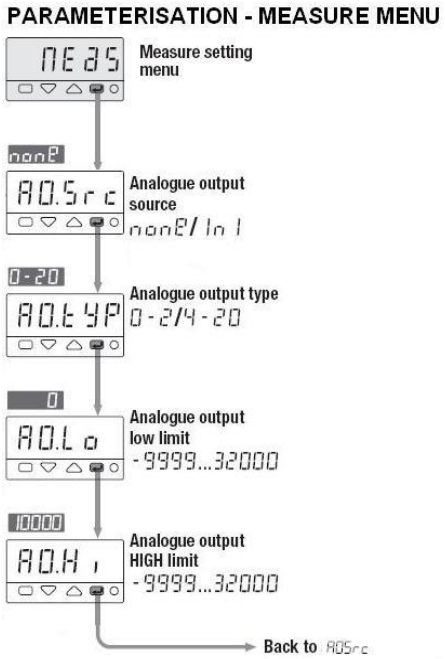
: Setting of alarm setpoint for alarm 1,
e.g. 200 (°C)

: Setting of alarm setpoint for alarm 2.
e.g. 280 (°C)

: Setting the hysteresis for alarm setpoint (alarm 1) in %, e.g. 10 (%) of a thermocouple type J (600 °C) = 6°C

: Setting the hysteresis for alarm setpoint (alarm 2) in %, e.g. 10 (%) of a thermocouple type J (600 °C) = 6 °C

Settings of the analogue output:



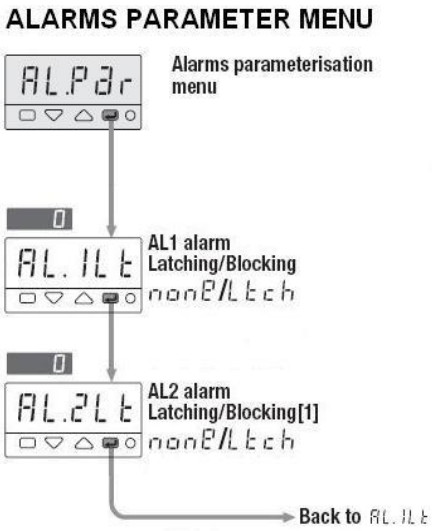
: Input signal for analogue output

: Possible settings of analogue output signal between 0 – 20mA (0-10V) or 4 – 20mA

: Setting of minimum analogue output value

: Setting of maximum analogue output value

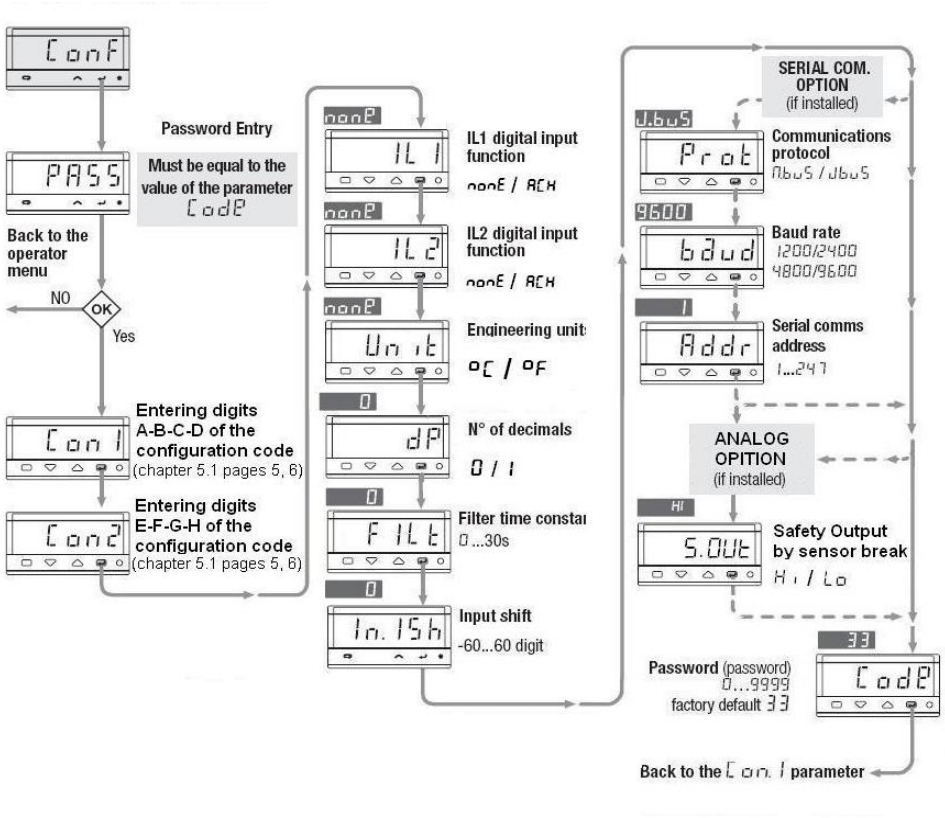
Alarm functions:



: Activate latching/blocking for alarm 1. Reset by pushing the asterisk (*) key.

: Activate latching/blocking for alarm 2. Reset by pushing the asterisk (*)key.

Configuration menu:



Explanation of the configuration menu parameters

ConF => PASS	: Entering the password for access to the relevant level
=> Con_1	: First configuration code see page 5
=> Con_2	: Second configuration code see page 6
□□=> I L 1	: Reset of alarm 1 via input 1 (terminal 5)
=> I L2	: Reset of alarm 2 via input 1 (terminal 6)
=> Un it	: Selection of engineering units between °C or °F
=> dP	: Adjustment of the decimal indication, e.g. 0 = 1234 or 1 = 123.4.
=> FI Lt	: Response time (seconds) to react to a value adjustment
=> in_ 15h	: Value by which the display is changed, e.g. if entering 5 and a temperature value of 100 (°C), the display shows a value of 105 (°C).
=> Prot	: Selection between Modbus and Jbus for communication records
=> bAUd	: Adjustment of the baud rate for communication, e.g. 9600 = 9600 Baud
=> Addr	: Adjustment of the communication address 1 … 247
=> S_OUt	: Switching behaviour of the alarm relay contacts of the analogue output in case of sensor break – see sensor break monitoring
=> CodE	: Adjustment of password: With a value of ≥ 5000, a password has to be entered before access is given to any of the parameter levels. If the value is below 5000, a password has to be entered only in the configuration level (password adjusted by Gneuß = 33)

Sensor-break monitoring:

The TMV 4 is equipped with a sensor-break monitoring for the temperature sensor in use.

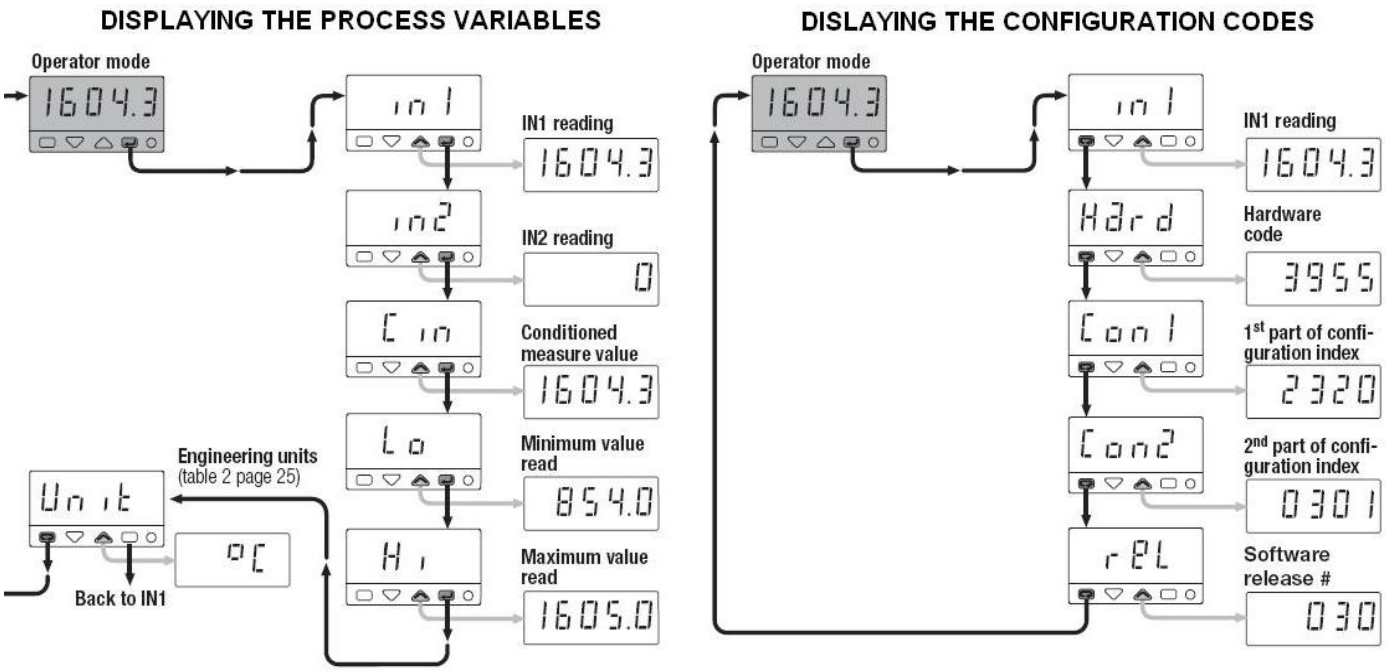
If one of these cables is disconnected and/or the temperature sensor is not connected, a sensor break is displayed by „88888“.
The analogue output reacts in accordance with the set parameter of S.Out as follows:

Hi = In case of sensor break, the analogue output gives a signal of > 21 mA.
Lo = In case of sensor break, the analogue output gives a signal of 0 mA.

In case of sensor break, the alarm outputs react in accordance with the set parameter of configuration code 2 (see page 6) as follows:

Con2 = 2200 and S.Out = Lo	In case of sensor break, the relays are open.
Con2 = 2200 and S.Out = Hi	In case of sensor break, the relays are closed.
Con2 = 3300 and S.Out = Lo	In case of sensor break, the relays are closed.
Con2 = 3300 and S.Out = Hi	In case of sensor break, the relays are open.

9. Additional functions:



Peak hold:

During normal operation of the TMV 4, the internal peak hold can be evaluated and deleted. The highest and lowest point of the temperature range ever reached is registered. This function allows temperature spikes to be registered. Every time the unit is switched on again, this measurement is re-activated.

Push : The minimum temperature value is displayed for five seconds.

Push : The maximum temperature value is displayed for five seconds.

Push : All values are deleted and reset to the current actual value. Measurement resumes until next point of deletion or until the unit is switched on and off again.

Display of measuring values:
During normal operation of the instrument, it is possible to allow the measuring value to be displayed in time intervals. By pushing twice, the following displays and settings are possible:

UnitA It_U = Deactivate / activate the interval display of the measuring unit during operation (YES / no)

10. Error reading:

Display:	Reason:	Error elimination:
	Sensor break	Replace temperature sensor Check/replace connecting cables
	Overflow	Value too large to be displayed or configuration code 2 does not correspond to the connected temperature sensor.
	Overflow	Value too small to be displayed or configuration code 2 does not correspond to the connected temperature sensor.

Gneuss Kunststofftechnik GmbH
Moenichhusen 42
32549 Bad Oeynhausen
Germany
Tel.: +49 5731 5307-0
Fax: +49 5731 5307-77
Email: gneuss@gneuss.com
www.gneuss.com